

WD-A186 671

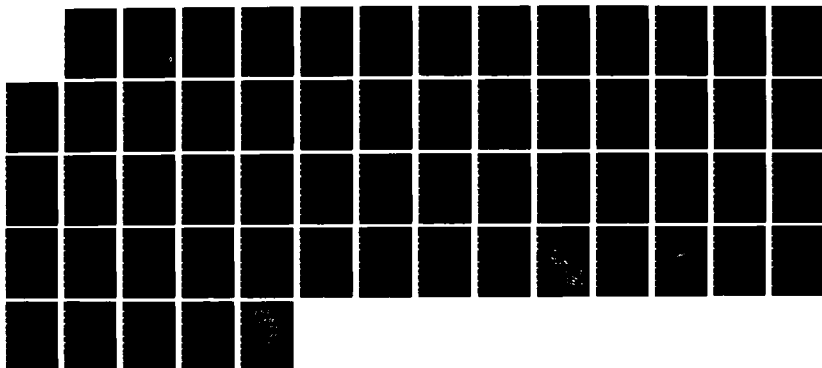
OPERATIONAL ART IN THE WESTERN DESERT THEATER OF  
OPERATIONS 1940-43(U) ARMY COMMAND AND GENERAL STAFF  
COLL FORT LEAVENWORTH KS SCHOO D W CRAFT 07 MAY 87

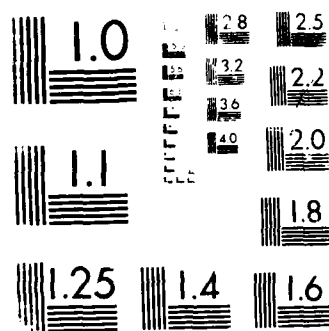
1/1

UNCLASSIFIED

F/G 15/6

NL





2. RESOLUTION TEST CHART  
 1963-A

DTIC FILE COPY

AD-A186 671

Operational Art in the Western Desert Theater of Operations, 1940-43.

by

Lieutenant Colonel Douglas W. Craft

Armor

Advanced Operational Studies Fellowship  
School of Advanced Military Studies  
U.S. Army Command and General Staff College  
Fort Leavenworth, Kansas

7 May 1987

DTIC  
ELECTE  
NOV 20 1987  
S H D

Approved for public release, distribution is unlimited.

APPROVED FOR PUBLIC RELEASE:  
DISTRIBUTION UNLIMITED.

87-3073

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

A12 671

## REPORT DOCUMENTATION PAGE

Form Approved  
OMB No 0704 0188  
Exp Date Jun 30, 1986

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b RESTRICTIVE MARKINGS	
2a SECURITY CLASSIFICATION AUTHORITY			3 DISTRIBUTION/AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE DISTRIBUTION UNLIMITED	
2b DECLASSIFICATION/DOWNGRADING SCHEDULE				
4 PERFORMING ORGANIZATION REPORT NUMBER(S)			5 MONITORING ORGANIZATION REPORT NUMBER(S)	
6a NAME OF PERFORMING ORGANIZATION SCHOOL OF ADVANCED MILITARY STUDIES, USA C&GSC		6b OFFICE SYMBOL (If applicable) ATZL-SWV	7a NAME OF MONITORING ORGANIZATION	
6c ADDRESS (City, State, and ZIP Code) FORT LEAVENWORTH, KANSAS 66027-6900			7b ADDRESS (City, State, and ZIP Code)	
8a NAME OF FUNDING/SPONSORING ORGANIZATION		8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c ADDRESS (City, State, and ZIP Code)			10 SOURCE OF FUNDING NUMBERS	
			PROGRAM ELEMENT NO	PROJECT NO
			TASK NO	WORK UNIT ACCESSION NO
11 TITLE (Include Security Classification) OPERATIONAL ART IN THE WESTERN DESERT, 1940-43				
12 PERSONAL AUTHOR(S) LTC DOUGLAS W. CRAFT				
13a TYPE OF REPORT MONOGRAPH		13b TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 87/5/7
15 PAGE COUNT 52				
16 SUPPLEMENTARY NOTATION				
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP		
			NORTH AFRICA OPERATIONAL ARTIST	
			STRATEGIC-OPERATIONAL INTERFACE LTG O'CONNOR	
			CULMINATION LTG ROMMEL	
19 ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>This monograph addresses the contribution made by the campaigns in the Western Desert to the evolution of the operational art by examining theory as reflected in history.</p> <p>It discusses the campaigns in the Western Desert of North Africa from September 1940 through January 1943. The discussion focuses on three operational issues that have impacted on the evolution of the operational art: the connection between strategic aims and the conduct of operations, the concept of culminating points, and the operational artist.</p> <p>The monograph first presents a broad overview of five major operations conducted in the Western Desert of North Africa from 1940-1943. After examining the three operational issues in detail, the author concludes that many elements of military theory have valid application as demonstrated in the major operations of the Western Desert. The theory offers a valid benchmark for study by the operational planner, but offers him no formulae. The conclusions support Clausewitz' assertion that, "...theory gives the mind</p>				
20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL LTC DOUGLAS W. CRAFT			22b TELEPHONE (Include Area Code) (913) 684-3437	22c OFFICE SYMBOL ATZL-SWV

BLOCK 19: ABSTRACT (CONTINUED)

greater insights into the mass of phenomena of their relationships and leaves it free to rise into the higher realms of action."



# ABSTRACT

OPERATIONAL ART IN THE WESTERN DESERT THEATER OF OPERATIONS, 1940-1943 BY LTC Douglas W. Craft, USA, 52 pages.

This monograph addresses the contribution made by the campaigns in the Western Desert to the evolution of the operational art by examining theory as reflected in history.

It discusses the campaigns in the Western Desert of North Africa from September 1940 through January 1943. The discussion focuses on three operational issues that have impacted on the evolution of the operational art: the connection between strategic aims and the conduct of operations, the concept of culminating points, and the operational artist.

The monograph first presents a broad overview of five major operations conducted in the Western Desert of North Africa from 1940-1943. After examining the three operational issues in detail, the author concludes that many elements of military theory have valid application as demonstrated in the major operations of the Western Desert. The theory offers a valid benchmark for study by the operational planner, but offers him no formulae. The conclusions support Clausewitz' assertion that, "...theory gives the mind greater insights into the mass of phenomena of their relationships and leaves it free to rise into the higher realms of action."

## TABLE OF CONTENTS

I.	Introduction.....	1
II.	Historical Overview.....	4
III:	Operational Issues.....	16
	A. Strategic-Operational Linkage.....	16
	B. The Culminating Point.....	24
	C. The Operational Artist.....	33
IV.	Conclusions.....	38
	Maps:	
	1. The Western Desert.....	41
	2. First British Offensive.....	42
	3. Rommel's First Offensive.....	43
	4. Auchinleck's Offensive.....	44
	5. Rommel's Second Offensive.....	45
	6. Montgomery at El Alamein.....	46
	7. Pursuit to Tunisia.....	47
	Endnotes.....	48
	Bibliography.....	50

## Operational Art in the Western Desert Theater of Operations, 1940-43

### I. Introduction

The campaigns in Western Desert of North Africa from December 1940 through January 1943 offer a unique opportunity to examine the evolution of the operational art. The theater of operations was well defined by Tripoli on the west, the Suez Canal on the east, the Mediterranean Sea to the north, and the Sahara Desert to the south (See Map 1). The rival powers were well represented and both sides employed a requisite portion of war's modern instruments: mechanized forces, air power, sea power, sustainment, and transportation. Several of World War II's most interesting personalities commanded the armies that contested the desert: LTG (later Field Marshal) Erwin Rommel for the Axis, and LTG General Richard O'Connor, General Sir Archibald Wavell, General Sir Claude Auchinleck, and LTG Bernard Montgomery for the British. Finally, all protagonists pursued strategic aims, though often vaguely defined, motivated by political policies that required the execution of major operations to achieve those aims. Later discussion examines the difficulty of establishing and maintaining the linkages between strategic aims and those operations required to achieve them.

The purpose of this monograph is to examine the events of the Western Desert and present operational issues for the reader to reflect upon in light of the body of theory of operational art. History, in this context, is a mirror upon which military theory can reflect. Through reflection, it is hoped that one will better appreciate the nature of operational art and the contributions made to the evolution of the art by the operations in the Western Desert.

The environment of the Western Desert was a major factor in molding the unique character of operations conducted there. Barren and severe, the Western Desert

measured both the soldier and his ability to wage war. With the exception of some Italian settlers and nomadic tribesmen, the landscape was void of inhabitants. Landmarks consisted of tombs, potholes, underground Roman water cisterns called birs, and mounds, craters or escarpments whose possession could be tactically decisive in tank warfare. Some compared the desert to a sea. Instead of coastlines, its flanks were salt water in the north and sand in the south. Navigation required a sun compass and sextant and mobility required low-pressure tires, reinforced suspensions, and "unsticking devices" for vehicles to use in negotiating the hard limestone plateaus and sand channels. Radiator condensers conserved precious water.<sup>1</sup>

The desert's emptiness permitted war to be waged without disturbing the terrain or its inhabitants, but also required all the instruments to conduct and sustain warfare to be imported into the theater. The more desert an army occupied, the more aggravated were its supply problems and more vulnerable became its communications.<sup>2</sup> Therefore, without continuous resupply and reinforcement, all gains in the Western Desert were transitory.

The lot of the soldier was described as almost a private war:

The fighting itself was accepted as exacting, frightening, exhilarating and somehow not-to-be missed adjunct of their nomadic existence. Discomforts there certainly were. Flies, the heat, gypsy tummy, monotony, the desert sores, the khamsin or gibleh--that swirling, driving, penetrating, sand-storm which brought all activity to a standstill, ...<sup>3</sup>

Command in the Western Desert presented challenges unlike those experienced by any protagonist in campaigns in Europe. Greater effort was required to insure even the soldiers' basic necessities. Leaders concentrated on generating the staunch morale needed to battle the elements, empty expanse, loneliness, and mirage created by the environment. The British solution to the challenge was to provide the best

possible materiel and offer an occasional respite in the rear areas of Alexandria or Cairo, where, incidentally, British commanders spent most of their time.

Rommel's solution aimed at nurturing the spirit of his desert soldiers. He chose to lead from the front and demanded that his commanders follow his example. He took every opportunity to visit soldiers and impressed the private soldier of both armies with his chivalrous attitude toward war in the desert. He believed rigorous training and the strengthening success of tactical victories would lighten their load.

The environment drove campaign design. No defensible terrain existed between El Agheila and El Alemain. Three large ports at Tripoli, Benghazi, and Alexandria provided the only locations for introducing into the theater the huge quantities of supplies to sustain the mechanized and motorized forces demanded by the vast distances of the desert. The area of operations consisted of steep escarpments leading up from the northern coast to a high plateau. Because the latter was impassable to vehicles except in the passes of Fuka, Halfaya, and Sidi Rezegh, these choke points became vital. Salt marshes in the south and the large Qattara Depression along the Egyptian frontier in the east canalized movement.

Only a single coastal road running along the escarpment traversed the entire area, and small desert tracks linked the few oases that dotted the landscape. Since positions could easily be outflanked throughout the majority of the area, the campaigns were designed around a series of mechanized envelopments with infantry hugging the coast to secure ports and sustain further advance.

Time was also an important operational design factor in the Western Desert. To build stores and train soldiers unaccustomed to desert fighting required time, and time was the enemy of the politician pushing for action.

This was the setting in which the operational artist combined the many tools of his art to create the operations now recorded as the campaigns of the Western Desert.

## II. Historical Overview

With the fall of France in 1940, allied attention shifted to the Middle East theater of war. This global crossroads was the key to Allied global strategy since it afforded vital central position in the global war.<sup>4</sup> Had the Allies lost control of the Middle East, there would have been a number of adverse consequences:

- \* Germany and Japan would have had a direct route for the juncture of forces.
- \* Turkey would have been isolated and compelled to cooperate with the Axis.
- \* Southern supply routes to Russia would have been closed.
- \* Axis powers would have secured the oil of the Caucasus and the Persian Gulf.
- \* Air ferry routes across Central Africa to the Middle East, India, and China would have been lost.
- \* Shorter Mediterranean supply routes to India and China would have been cut at the Suez Canal.
- \* The Allies would have lost control of the most likely point from which to strike at or threaten Hitler's rear.<sup>5</sup>

Operationally, it was on the battlefields of the Western Desert that the weakness of the Axis was first revealed. When this was finally exploited, Italy was spent and could not control the Tunisia, the Mediterranean islands of Sicily, Sardinia, and Corsica, or even the Italian mainland. The physical conquest of the Mediterranean littoral of North Africa insured Allied domination of the Mediterranean Sea, its shorter sea lanes to the Middle East, and new routes for direct invasion of Europe through Tunisia.<sup>6</sup> Finally, it was through operations in the desert of North Africa that the Allies gained valuable tactical and operational experience that served to forge the strong Anglo-American cooperation which eventually led to Allied victory.

The ebb and flow of operations across the Western Desert consisted of a series of advances and retreats by both sides which British soldiers quickly dubbed the "Benghazi Handicap".<sup>7</sup> The race began in September 1940 when Italian forces occupied Sidi Barani and ended with Montgomery's conquest of Tripolitania and Tunisia in January 1943. In between, two British attempts nearly succeeded in securing Tripoli in December 1940-February 1941 and November-December 1941, while Rommel's Afrika Korps twice controlled Cyrenaica to the Egyptian frontier in March-May 1941 and January-July 1942.

Initially, General Graziani's limited offensive in September 1940 halted with five divisions having pushed back a weak British screening force and occupying a series of fortified camps scattered in the desert astride the coastal road. Two British divisions occupied defensive positions at the Mersa Matruh railhead. As Graziani argued about subsequent actions, Wavell seized the initiative with an attack delayed by the requirement to send forces to Greece. The Western Desert gained Hitler's attention when LTG O'Connor's force brilliantly destroyed nine Italian divisions and occupied Cyrenaica (See Map 2). O'Connor rapidly cut through the gaps

of the scattered Italian forces, boldly cut off their retreat, and captured scores of men and equipment.

The Italian Tenth Army was virtually wiped out in a two-month British advance that covered over 500 miles and took 130,000 prisoner, 400 tanks, and 1290 guns at a cost of 1928 British soldiers.<sup>8</sup> Although the Mediterranean was clearly a secondary theater of war for Germany, the destruction of the Italian Tenth Army compelled Hitler to dispatch forces to shore up the Italian effort and keep his ally in the war. Part of Hitler's reinforcement solution was designation of LTG Erwin Rommel as commander of German forces in North Africa. This choice of leadership transformed the Western Desert from a rescue and holding action into a sink for Axis combat power.

Just as a British victory in the Western Desert became possible, events in East Africa on Egypt's southern flank and in Greece prevented the British from capitalizing on this success. Before Axis forces in North Africa could be eliminated, Wavell was stripped of forces to reinforce LTG Sir Alan Cunningham in East Africa and to meet Churchill's political commitment to help Greece fend off an invasion by Italian and German forces. Consequently, Wavell was forced to hold his gains in Cyrenaica with an understrength armored brigade.

Remarkable British successes led to the surrender of Italian forces in East Africa, but the forces sent to help Greece were inadequate and forced to withdraw by May 1941. In the meantime, British lost an operational opportunity to conquer Tripolitania and Tripoli and the rapid defeat of Italian forces hastened the deployment of German air and ground forces to the Western Desert. The resultant drain on Allied resources in a campaign lengthened by nearly two years had both strategic and operational effects on the rest of the war.<sup>9</sup> Men and materiel required for subsequent campaigns had to be marshalled from other sources, a process which set back the timetable for each succeeding operation. Only Hitler committed a greater

mistake by invading Russia.

The British did not expect Rommel to be capable of launching offensive operations until approximately two months after his first division, the 21st Panzer, landed in Tripoli in February 1941. Rommel, however, sensed the reasons for British successes in North and East Africa and realized that only reduced forces held the Cyrenaican frontier. On 24 March 1941, he struck with elements of the 21st Panzer Division and captured El Agheila from the British armored outposts. (See Map 3).

Axis air efforts made the port of Benghazi untenable, while the faster German tanks sought the open southern flank and struck toward Derna and Tobruk. After pushing back elements of the delaying force around Agedabia and Derna-Meklii and capturing LTG O'Connor in the process, Rommel launched an attack upon Tobruk with only minimal preparation. After three days of stiff resistance by British artillery and Australian infantry withdrawn into well-prepared defenses, the attack halted and the 15th Panzer Division came forward from Tripoli to initiate siege operations.

The British decisions to hold Tobruk, reinforce the garrison, and supply it by sea denied Rommel a port to support an advance deep into Egypt. It also threatened his extended ground lines of communication and prevented his advance beyond the strong defensive positions on the frontier. At the same time, with Tobruk besieged and Egypt's frontier threatened, Wavell came under increasing political pressure to relieve Tobruk and achieve a quick victory over German forces. Operations Brevity and Battleaxe were conducted to meet these demands.

Because the escarpment along the coast was impassable to vehicles inland for nearly 50 miles, the operations along the frontier were centered on the two passes at Sollum and Halfaya. Wavell ordered a two-division attack on 15 June. However, the two divisions were organized into six independent armored task forces and committed piecemeal. Though Capuzzo fell, the Sollum and Halfaya passes were held by the Germans. On 16 June heavy tank losses at the hands of German 88-mm guns and

Rommel's dynamic personal leadership caused the British to withdraw from their initial objective at Sidi Omar. The defeat precipitated Churchill's loss of confidence in General Wavell and signalled his transfer to India. It was now up to his successor, General Sir Claude Auchinleck, to meet Churchill's demands.

Auchinleck's first order of business created the British Eighth Army commanded by General Sir Alan Cunningham, the victor in the East Africa. His appointment and promise of reinforcement created renewed optimism for the British. At the same time, German concentration on the invasion of Russia forced Rommel to pause.

Though the German invasion of Russia required Britain to strengthen defenses between India and Syria at the expense of the Western Desert, Auchinleck directed the Eighth Army to begin planning its first offensive. In the meantime, Rommel molded the 90th Infantry Division and the 15th and 21st Panzer Divisions into the desert-trained, battle-hardened Afrika Korps; and Axis frontier defenses were strengthened at Bardia, Sollum, Halfaya, and Sidi Omar.

Reinforced by American Stuart tanks, Cunningham planned a short "left hook" toward the invested Tobruk to bring Rommel to battle (See Map 4). Operation Crusader's dawn attack on 18 November 1941 achieved complete surprise, and the armor-heavy XXX Corps swung across the frontier while the XIII Corps, consisting primarily of light infantry, attacked northward to isolate Sollum and Bardia. The ensuing two weeks saw a series of independent and uncoordinated actions with the same ground being taken and retaken throughout the Tobruk-Sollum-Bir el Gobi area.

On 18 November British armored forces seized the commanding terrain of Sidi Rezegh south of Tobruk, but an ill-timed breakout attempt failed to link up with elements of the 7th Armored Division there. By 23 November German forces had retaken that position and blocked the British spearhead. On 24 November Rommel passed up an opportunity to defeat British armored forces piecemeal and made a daring thrust to the frontier wire in an attempt to end the battle and avoid further attrition.

Failing to uncover British supply depots and finding British resolve unwavering, he swung back to engage the New Zealand 6th Division of XIII Corps as it pressed beyond Gambut in an attempt to link-up with the breakout from the Tobruk garrison.

This time the breakout succeeded and the British link-up split the Afrika Korps. Then on 1 December, German forces destroyed the Australians, broke through, and joined panzer elements to the south to reinvest Tobruk. However, with supply lines cut and British forces consolidating their positions, Rommel was forced to pull back to prevent encirclement and stabilize his lines from Bir el Gobi to El Adem.

During the first week in December additional British tank reinforcements reached the front from bases in Egypt. German forces continued to pull back; and after expensive rear-guard actions and a heavy disengagement battle, reached Gazala on 15 December. Though his lines were pierced and turned, Rommel managed to escape envelopment, receive reinforcements of two Italian divisions from Tripoli, and stabilize another line near defensible El Agheila. There he rested and refitted while the British eliminated pockets of resistance at Bardia, Sollum, and Halfaya.

At the close of 1941 in the Middle East theater of war, the British had completed a successful offensive into Cyrenaica and had broken the siege of Tobruk. Elsewhere, the Russians had staunchly defended Moscow, Ethiopia had been liberated and the Italian presence reduced in East Africa, and no immediate threat existed to Turkey or the Persian Gulf. However, Japan's entry into the war on the Axis side caused concern for the security of India and Australia and somewhat lessened the satisfactory picture by drawing assets from the Middle East. Concern for the Far East was offset by the anticipated commitment of the United States but its mobilization took time. The near term demanded effort of mind and will.

The first order of business for both sides was to build up supplies along the El Agheila front lying 450 miles east Tripoli and 800 miles west of Cairo respectively.

At the same time, British heavy forces withdrew from contact with only light patrols remaining on the front lines.

Once again, Rommel was ready first. He attacked along a narrow front on 21 January 1942. Dispersed and understrength, British forces were caught off balance and fell back to avoid destruction. Using captured supplies of fuel, Rommel pressed his attacks and gained enough momentum to recapture Benghazi by the end of January.

British forces gathered strength and established a defensive line running south from Gazala on 4 February. The line was weak, but the rapid German advance had come so far so quickly that Rommel needed time to reorganize before he continued the attack. The Germans took nearly four months to refit and train during which time they made no serious attempt to press British forces.

While the world's eyes were focused on the Phillipines and German submarine activity in the Atlantic, forces in the Western Desert were planning an offensive. Both sides, however, needed to stock supplies to support any effort. RAF and Royal Navy assets concentrated with success on attacking ships at sea, ports, and reserve fuel dumps while Malta continued to occupy Axis air efforts.

British defenses along the Gazala line had developed into a complex of irregular strongpoints called "boxes" connected by extensive minefields. The line extended from Gazala to Bir Hacheim with a critical junction named Knightsbridge, where Trig Capuzzo running west from El Adem intersected the north-south trail from Acroma to Bir Hacheim. The British flank lay open south of Bir Hacheim but mobile reserve armored forces were deployed to cover it.

Rommel's forces were numerically inferior, and British strength continued to increase. Rommel felt compelled to act before the situation worsened and believed that he could defeat the British armor with a swift drive around the open flank and then move to capture Tobruk. The Afrika Korps initiated a night attack on 27-28 May 1942 with the two panzer divisions moving toward Acroma and the 90th Division tasked

to capture El Adem on the first day. The Italian's supporting attack along the coast never materialized, but the Afrika Korps flanking attack was well-executed and eventually unhinged the British defense by defeating the Free French brigade at Bir Hacheim.

Auchinleck finally decided to hold Tobruk and fall back to the Egyptian frontier. But Tobruk, the previous symbol of British resolve, was taken by a powerful coordinated attack of the Afrika Korps supported by dive bombers and concentrated artillery. By the end of the first week in July, the line of defense settled on the Egyptian frontier positions planned by Wavell and developed by Auchinleck (See Map 5). There an exhausted British force stopped an equally exhausted Axis force.

The next two months were tense in the Middle East with Rommel knocking at Alexandria's door. In Russia, the latest German drive was moving toward the Caucasus, overrunning most of southern Russia and closing like a pincer on the Middle East. Once again the juncture of Axis forces was possible with the fall of the Phillipines and Burma and Japanese forces in India.

When Montgomery assumed command of the Eighth Army on 13 August 1942, he resolved to fight on the El Alamein line. The Allied invasion of North Africa had been postponed and the Eighth Army had priority of men and equipment to insure defense of the Suez Canal. The terrain was favorable with strong defensive positions guarding the narrow strip between the Mediterranean Sea and the Qattara Depression. The series of boxes astride the road similar to those near Bir Hacheim were the pivotal points of the defense. Rommel was at the end of a frequently interrupted LOC as Allied strength grew daily.

Montgomery saw the need to prepare for an offensive while continuing to strengthen the vital defense guarding his base of operations. He insisted on a program of rigid training and decided to fight his units only as divisions and corps,

rather than as separate brigades, with armor and artillery employed only in mass. A special armored corps of the Eighth Army's best was created as the Army reserve. As preparations for the defense and a new offensive continued concurrently, Rommel attacked with a repeat performance of the night attack at Knightsbridge.

The battle for Alam Halfa Ridge pitted four German and six Italian divisions against the British Eighth Army deployed with four infantry divisions dug-in along the front, an armored division covering the left flank, an armored division and an armored brigade dug-in in forward of the ridge and an infantry division in reserve. The ground was well-prepared, and the British made good use of the minefields. Rommel's main effort in the south consisted of the Afrika Korps and an Italian corps. Though some progress was made and some gaps opened in the minefields, Montgomery was able to shift forces and engage Rommel on ground of his choice.

By 2 September, Montgomery was able to thin the north and begin a counterattack to close the gaps in the minefields. Unable to force the British armor out of prepared positions and feeling the impact of the relentless pounding by the RAF on formations and supplies, Rommel began to pull back. Since Montgomery could not trap Rommel's forces with the counterattack, he called off the battle and did not allow his forces to press beyond Deir el Munassib. He had decided to stick to his completed plans for the offensive, and keeping Rommel's forces in the south supported his planned attack in the north. What would become the Axis' last offensive in the Western Desert ended with a decided shift in initiative to the British forces.

Though the Battle of Alam Halfa delayed offensive preparations, by October 1942, Montgomery was satisfied with the readiness of the Eighth Army. Hundreds of tanks and self-propelled artillery pieces had arrived from the United States and extensive stocks had been moved forward. Dumps were camouflaged, six new roads were built, and preparations were made to extend the railroad as operations progressed. Special port teams were organized to use captured facilities so sea LOCs could be used

immediately.

Rommel used the time to strengthen and deepen his defenses with additional minefields to slow forces in the north and canalize a penetration in the south. However, supply lines were continually attacked by British air power and the armored cars of the Long Range Desert Group, and these efforts placed even greater strain on his overextended lines of communications.

Montgomery attacked on 23 October behind a preparation of over a thousand guns. The three-phased plan intended to battle for advantageous position, reduce the enemy strength and resources with a series of strong thrusts, and finally break out. The breakout would signal the collapse of the enemy's position and initiate the pursuit (See Map 6).

Initial gains were small, but a series of dogfights was well fought and German counterattacks were neutralized. Heavy German tank losses resulted. By noon on the 25th Montgomery switched the axis of the main effort to the 9th Australian Division in the north. The Australians were moderately successful against strong defenses, but Rommel had anticipated the offensive and pulled back troops and guns from forward positions to gain depth. Although the British were through most of the minefields, they were still ringed by strong anti-tank defenses.

During a pause for the British XXX Corps to reorganize, the Axis launched a counterattack with the panzer divisions of the Afrika Korps. Their initial attacks were repulsed, and the RAF disrupted a second advance before it could begin. By the 29th of October, the Australians were on the move again; and intelligence reported a weakening of the Axis line held by Italian infantry further to the south. With the Australians keeping Rommel's focus north, the breakout attack called Operation Supercharge was launched at 0100 hours 2 November behind a rolling barrage. A new corridor on a narrow front was established, but the strong antitank screen continued to take a heavy toll of the breakout force. It was not until later on the 3d that

the enemy movement west was reported. A strong infantry night attack succeeded in widening a gap in the anti-tank screen near Tel el Aqqaqir, and by the 4th of November, two armored divisions and the 6th New Zealand had rushed through the gap with the enemy in full retreat.

The Battle of El Alamein took place at the same time as the defense of Stalingrad. Together they marked the high point of Axis aggression and signalled the seizure of the strategic initiative by the Allies. Operationally, El Alamein was marked on the British side by methodical and detailed preparation; the staging of overwhelming combat power; frequent pauses for reorganization and regrouping to maintain balance; and a deliberate, flexible, and precise conduct of battle that included adequate plans for sustainment. The Eighth Army concentrated combat power to sever the Italian infantry from the Afrika Korps and to destroy the anti-tank screen with infantry and massed artillery before committing the armored breakout force. Once these ties were cut, British forces fighting for the first time as divisions and corps brought their mass and air power advantages to bear to defeat the Axis center of gravity, the armored divisions of the Afrika Korps.

The same deliberation that marked the breakout characterized the pursuit to Tunisia (See Map 7). With X Corps consisting of the 1st and 7th Armored Divisions combined with the 2d New Zealanders as the pursuit force and the XXX Corps providing direct pressure, several unsuccessful attempts were made to cut off what remained of the Afrika Korps after the destruction and capture of the Italian divisions. The coast road was clogged, and all desert trails were bogged down by torrential rains. The RAF's attempts at low level bombing produced poor results; and German movement, though chaotic, continued west. On only one occasion was the 21st Panzer Division required to occupy a hasty self-defense posture when it ran out of fuel.

With the weather causing trafficability problems and Rommel skillfully withdrawing remaining portions of the Afrika Korps, Montgomery altered the pursuit

criteria to concentrate on preventing any rest for Rommel, establishing forward air bases, and opening ports to insure the drive was sustained. At one point the pursuit force was reduced to one armored division to ease the sustainment problem.

As the November 8th Allied invasion of Algeria and French Morocco continued to build in strength, Axis attention became divided. Montgomery's pursuit continued for weeks with Rommel withdrawing each time before an encircling force could negotiate the boggy desert trails. A British pause at El Agheila to open the port of Benghazi, bring forward two fresh divisions, and shift the pursuit to the XXX Corps was Rommel's last respite. At this time, he was finally able to obtain some resupply, but most men and equipment went to Tunisia. From this point the pace quickened. By 23 January 1943, the Eighth Army occupied Tripoli and the 7th Armored Division closed on the old French fortifications at Mareth. Here Rommel had prepared strong defenses and linked with German forces in Tunisia. The Eighth Army had pushed the Axis nearly 1400 miles in three months. It eliminated the Axis base of support at Tripoli and cleared Egypt of all Axis forces, destroying or capturing most of the Italian Army in the process. Finally, it consolidated the airfields in Cyrenaica that provided land based air cover for convoys in the Mediterranean. These gains marked the end of the Western Desert campaigns and the beginning of operations that would set the stage for the Allied invasion of Europe.

### III. Operational Issues

Any number of operational issues can be gleaned from the campaigns in the Western Desert. Several, such as attacking strength with weakness, use of the indirect approach, the combination of the operational offensive and the tactical defensive, the synchronization of air, land, and sea battles, and the roles of chance and friction have been suggested in the historical overview. They will be discussed again since they are intertwined with many other issues. There are, however, three issues that require focused discussion. The first addresses the linkage of operations to strategic aims and the relationship of a theater of operations to a theater of war. The second is an examination of the theoretical concept of the culminating point and its impact on operations and operational design. Finally, there is the operational artist--in this case several artists--and the qualities that they possessed that made a difference in their practice of the operational art.

#### A. Strategic-Operational Linkages

To understand how operational objectives did or did not link to the attainment of strategic aims of either protagonist in the Western Desert, an appreciation of the relationship of the Western Desert theater of operations to the Middle East theater of war is required. For each side, the relationship was somewhat different.

Hitler, who actually determined Axis strategy, regarded the Middle East theater of war as a holding effort secondary to the campaign in Russia. His specific aims in the Mediterranean were to pressure Spain to close the Straits of Gibraltar and cripple Royal Navy dominance of the Mediterranean, to use a weaker Italian ally to tie down British forces with the potential to be used elsewhere, and to threaten

Persian Gulf oil and the Suez Canal with an advance through the Balkans and Turkey. The introduction of German forces into the region was an urgent response to the Italian setback. The destruction of the Italian Tenth Army in Cyrenaica raised the possibility of the collapse of Italy's war effort and even an inability to secure the Italian land mass. Such a situation would pose an unacceptable threat to the southern flank of the Russian invasion force. The relevant question here is, how did a rescue operation designed to keep Italy in the war and provide an economy of force measure to tie down the British become a sink for Axis combat power?

A large part of the answer was the selection of LTG Erwin Rommel to command the Axis force. Rommel's past performance record and dynamic personality made aggressive offensive operations a foregone conclusion. Furthermore, he possessed a unique relationship with the Fuehrer that permitted him to circumvent General Kesselring, the Axis Mediterranean theater of war commander and take advantage of his heroic following and persuasive personality.

Another factor developed within the theater of operations itself. The early success of the battle-hardened German soldiers over the inexperienced British troops supported Rommel's arguments and enlarged German expectations. No better example of this was his first offensive from 24 March-30 May 1941.

In less time than the previous British offensive, German forces drove to the Egyptian frontier, invested Tobruk, and captured LTG Richard O'Connor, Western Desert Force commander. When Wavell mounted a counteroffensive, Rommel was able to retain the vital passes along the Egyptian frontier and deny attempts to relieve Tobruk. These successes intensified Rommel's conviction that the operational objective of defeating the British forces could be accomplished with a single thrust into Egypt. This would achieve the strategic aims of keeping the Italians in the war and securing the southern flank, and would in addition gain the prize of the Suez Canal and a route to the Persian oil fields. The campaign demonstrated that Rommel was a great

innovator and tactical commander, and in his vision the operational objective was linked to the Axis' strategic aims. However, the true significance of this objective and its associated requirements were not grasped by the Fuehrer or the German General Staff. The end result was inadequate and unsynchronized resources and supporting operations employed to attain the objective Rommel envisioned. This was particularly true of air power and sustainment, both strategic and within the theater of operations.

Rommel failed to estimate the resources required to drive to Alexandria and thus designed a major operation whose resource requirements were far greater than what Hitler and Kesselring were willing to commit to the venture. Rommel's operational ambitions were thus totally inconsistent with strategic aims and resulted in a critical disconnect even though his artist's vision was correct.

As a result, tactical successes taxed the sustainment system but at the same time continually fell short of a decisive victory that appeared to offer success at the cost of just a few more combat forces. Without sea power with air cover to bring adequate supplies into the theater of operations and without adequate infrastructure with air cover to distribute supplies and equipment, combat forces could not be decisively employed. We will examine this point more closely in a discussion of culminating points.

Even though Rommel could establish a linkage between tactical successes and an operational objective, the fundamental disconnect remained between the operational objective and the strategic aim. In fact, Rommel's dynamic personality and brilliant tactical successes elevated the Western Desert theater of operations to the primary theater of operations within the Mediterranean theater of war. But any attempt to realize the strategic potential that might have existed was limited by Hitler's determination that the direct conquest of the Soviet Union was his most significant strategic priority. In the end Rommel's determination, or perhaps obstinacy, to

continue to conduct offensive operations merely served to weaken Axis forces through attrition and ultimately led to the destruction of Italy. An ally was lost and soon the southern flank would fall. Meanwhile British forces continued to gain both materially and spiritually.

For the British, the Middle East theater of war was the primary theater, while the Western Desert was a theater of operations whose priority vacillated with the political winds and their accompanying strategies. From Britain's perspective, the Western Desert was the only ground theater where the Axis could be confronted. Politically this was significant for two reasons: Churchill needed a victory to show results at home and to maintain his government in power; and from an Allied perspective, once Russia was invaded it could not win or be allowed to win without the British fighting somewhere.

Regardless of its political significance, the Middle East theater of war possessed a strategic importance of its own. First, the Red Sea and Suez Canal provided the southern supply route for US support of British forces in the Middle East itself and Russia. Secondly, as the threat to oil and the strategic sea LOCs to the Far East and Indian theaters grew in importance, so also did the need for forces in the Western Desert to protect the Suez Canal and the Persian Gulf. However, it was the fluctuations in political policy and accompanying deviations from the strategic aims that caused a disconnect in the linkage between operational objectives and the strategic aims they were chosen to support. Consequently, adequate means were not provided at the proper time to achieve the desired ends and in some cases the ends themselves changed. Both resulted in destruction of the vital links.

The initial Anglo-French strategy voiced in September 1939 was to conduct a strategic delaying action to buy time to rebuild neglected and surrendered arsenals. The Allies agreed that decisive action would be taken against Italy while building strength to undertake an offensive against Germany.<sup>10</sup> Additionally, Churchill felt

that a quick victory would sway Free French participation in the Allied cause, a view that neglected the depth of anti-British feeling in France.

These were the strategic aims that LTG O'Connor's Western Desert Force operations were supporting when they executed the brilliant offensive that destroyed the Italian Tenth Army. However, Churchill's directive to shift air and ground forces to meet a political commitment to Greece did not allow O'Connor to reach his operational objective--destruction of both the Italian forces and their support base in Tripolitania which permitted the German reinforcement of Italian forces. The operational consequence of the early defeat of the Italian force was to create a crisis that introduced a stronger German opponent with a port and support area to facilitate its operations. Instead of being able to concentrate on the weaker Italian ally, the British were forced to deal with an experienced German panzer division supported by combat-proven air power and a system to employ it. Fighting in the Western Desert was lengthened by two years as a result.

By early 1941, the pattern of Axis operations was changing the strategic balance in the Middle East theater and confusing British strategic thinking. Four campaigns were being prosecuted simultaneously--Cyrenaica, Greece, E. Area, and Somaliland. While Wavell was being directed to provide forces for Greece, the importance of a quick decision in East Africa was being urged by Churchill. When reinforced Axis forces in Cyrenaica begin to move on El Agheila, Churchill presumed that Wavell was only waiting for the proper moment to strike back. He later wrote that the desert flank was "the peg on which all else hung," and not worth any risk at the expense of operations elsewhere.<sup>11</sup> Yet, previous correspondence from Wavell stated the extreme risk assumed in Cyrenaica to allocate forces elsewhere.<sup>12</sup> The combination of conflicting priorities and the resultant piecemeal commitment of resources made the attainment of any operational objective with the proper strategic linkage strictly a product of chance and Wavell's genius.<sup>13</sup> This linkage was achieved in East Africa

but not in Greece. It was severely delayed in the Western Desert.

Following the British withdrawal from Greece and the destruction of Italian force in East Africa, Wavell felt that it was necessary to balance the situation in the Middle East theater. With the political commitment to Greece met at least in form, Churchill's focus returned to the necessity of seizing the strategic initiative. The best opportunity to do this remained in Tunisia as it had been originally. By the same token, the best access remained the Western Desert. But to take advantage of these facts still required a build-up of modern combat equipment and trained soldiers. Both of these took time as did the proper planning and preparation for their employment. But Churchill's need for a victory to shore up his government also remained, and time was at a premium.

During the remainder of 1941 following Rommel's first offensive, Axis concentration was on operations in Russia. The only strategic pressure on the Middle East theater was applied in the Western Desert. Once again, Churchill's demand for quick results to support his government and to support Britain's alliance responsibility to Russia was the constant broadcast from London. Both Operations Brevity and Battleaxe fell prey to this impatience, and British forces were required to attack without adequate buildup of equipment, sustainment, and training. The strategic aims of seizing the initiative, defeating Italy and threatening Hitler's rear had stabilized. Additionally, the operational objective of siezing Tunisia and securing the North African coast was properly linked. However, the means were not yet available to attain the desired end. Moreover, the constraint of time was too great to permit a decisive victory. The resulting operations failed to secure even limited objectives, and there was only a weak operational linkage of battles through a campaign design. Instead, valuable combat power and sustainment assets were expended, and Rommel remained on the Egyptian frontier.

With the formation of the British Eighth Army in August 1941, the transfer of

additional combat power into the theater of operations from Great Britain, East Africa, Palestine, and elsewhere in the Commonwealth and the receipt of modern aircraft, tanks, and equipment from the US and allies, adequate resources were staged to launch a offensive with the potential for success. German efforts to capture Moscow had stalled and the Russians were launching their first counteroffensive. Rommel was at the end of an extended supply line and air power was being taken away from him. His position was vulnerable. British planning was meticulous to include thorough and methodical training. Crusader formed the centerpiece of a campaign that appeared to have all the requisite ingredients for success. Why was the campaign not decisive?

This time the disconnect was neither political nor operational, but tactical. Failure to destroy the armored forces of the Afrika Korps allowed them to withdraw to prepared defensive positions at El Agheila and gain time for reinforcement and refitting. At this time, Japan initiated its attack on Pearl Harbor and the Phillipines. Strategic minds in London were forced to turn to the East where vulnerable Commonwealth nations had to look inward for their own defense. The defenses in India had to be strengthened to prevent the juncture of Axis forces. Australia, New Zealand, and India were forced to redeploy forces from the Middle East theater. Rommel initiated a limited counterattack that stabilized along the Gazala line for four months and both forces moved supplies forward to renew the offensive. Operationally, British efforts were concentrated in Royal Navy and RAF attacks on ports and ships at sea to interdict Rommel's supplies. But Rommel was able to build up to a force just slightly smaller than the British Eighth Army, and that was all the brilliant tactician needed. His second offensive, which placed him once again on the Egyptian border, was a result of sheer tactical proficiency. But in the process he neglected sustainment and regeneration of forces, and January 1942 found the exhausted and depleted Eighth Army facing an equally exhausted and depleted Axis

force that was once again on an extended line of communication while the British had fallen back on their sustainment base.

The bleak strategic situation of the summer of 1942 that saw Axis success in North Africa, the Caucasus, the Phillipines, and Burma also saw a firming of what was now Allied global strategy. The Anglo-American strategists decided to postpone the invasion of Europe and to prepare for an Allied invasion of North Africa in the fall. They also agreed to give priority to the defense of Egypt and the Suez Canal and to prepare for an offensive to seize Tunisia.<sup>14</sup> The tactical battles were left to the strong-willed, methodical, and thorough LTG Montgomery. Time constraints were eased, and all efforts were synchronized for the final offensive. This time the ways, means, and ends were properly linked and the constraints permitted a campaign design that would ultimately lead to a decision.

Several conclusions regarding the relationship of strategic aims and operational objectives can be drawn from the campaigns in the Western Desert. German experience demonstrated that a disconnect between strategic aims and operational execution can occur as a result of the dynamic personality of an individual commander if he is not held within constraints and restraints commensurate with those aims. It also indicated that tactical success can blind commanders at all levels and appear to promise a decision. However, when these successes are gained within an operational design that does not support the strategic aim, operational failure and ultimately strategic failure may result. British experience illuminates another facet of the relationship of strategy and operational design. The flexibility of an operational design has limitations beyond which the strategic aim cannot be attained. One of these limits is the fluctuation of strategic aims either as a result of policy or as a consequence of the enemy's operational patterns. Finally, properly chosen operational objectives are achieved by timely tactical successes and synchronized

supporting operations. In all instances, the disconnects were exacerbated by untimely or inadequate resource allocation by the national command authorities that affected the means available to accomplish the campaign objectives. The most precious of those resources were soldiers and time.

#### B. The Culminating Point

Consideration of resources leads to the next concept for analysis--that of operational culmination. The concept of the culminating point and its relationship to operational design is complex, but it provides a valuable tool for examining the evolution of the operational art in the Western Desert campaigns. Clausewitz addresses the concept in terms of the physical and moral strength available to a force and the factors of strength that reduce or increase strength during the course of an attack or defense.<sup>13</sup> The theory suggests that there is a point beyond which the balance of strength turns and an enemy reaction follows.<sup>14</sup> For the attacker the advance will continue until his superiority is exhausted and for the defender he will defend until no further advantage can be gained by waiting to attack. When examined in the greater context of a campaign plan to achieve victory, the relationship is expanded in scope. Since both attack and defense are conducted by each side during a campaign, the problem of recognizing the possibilities that exist at any time during the campaign is a critical focus of the commander and his planning staff. The problem of recognition becomes more difficult when one considers the many factors that comprise the force equation and the dynamic nature of these factors. Once the possibilities are recognized, operations must be designed within the possible or imagination and innovation must expand the possibilities to achieve victory.

To illustrate the physical and moral dimensions of the theory, Clausewitz uses the physical analogy of a force being gradually applied to a ball in motion that can

be overcome if there is not enough time for it to operate. He further uses the cybernetic analogy of a train of thought set in a certain direction or turned back toward a refuge, in which arguments may compel one man to stop and justify another to act.<sup>17</sup>

Neither the physical nor moral points will be easily appreciated by the commander or his staff. Meanwhile, as action continues, the threshold may be crossed without knowing it.<sup>18</sup> Clausewitz believed that this explained how a commander,

"could overshoot the point at which, if he stopped and assumed the defensive, there would still be a chance of success--that is equilibrium. It is therefore important to calculate this point correctly when planning the campaign. An attacker may otherwise take on more than he can manage and, as it were, get into debt; a defender must be able to recognize the error if the enemy commits it, and exploit it to the full."<sup>19</sup>

With this as a starting point, does the theory help us explain the ebb and flow of operations across the Western Desert? Rommel's first offensive and Auchinleck's Operation Crusader provide a framework for discussion. In both cases, the operations began with each force nearly equal in soldiers and tanks. The forces were positioned on the defensible terrain closest to their bases of operations. Logistical bases and the mobile forces that protected them were the objectives for both sides. Operational maneuver aimed to destroy mobile defense forces by a series of infantry attacks to hold forces along the single coastal road while armored forces sought an assailable flank. The attacks were designed as deep envelopments that would threaten forward supply bases and extended lines of supply. In the barren desert this threatened the very existence of the opposing force and brought it to battle.

The center of gravity for each protagonist was its armored forces, but the critical factors of operational design were the geography of the theater of operations and sustainment. Geography was important in the sense of vast distances,

limited transportation infrastructure, and the scarcity of defensible terrain--terrain from which one force could be destroyed and on which the other force must be sustained until a decision could be reached. Sustainment was critical because as one force advanced and its supply line became tenuous, the other became stronger as it fell back on its base and repelled the weakened attacker.

Since all tools of warfare were required to be brought into the theater, the means of transport and distribution were matters of operational import. A critical parameter in campaign design was recognizing the impact that geography had on sustainment because the result would be culmination. Operational maneuver was constrained by the umbilical cord that connected the tactical forces to ports such as Tobruk and Benghazi, to their respective bases of operations in Tripolitania and Egypt, and ultimately to sea lines of communication into the theater. Supporting air and sea operations directed toward those means of transportation and distribution influenced the offensive culmination of the attacker and provided more time for the defender.

A commonly held view is that Italy's inability to sustain the Afrika Korps was Rommel's "Achilles Heel". But that only addresses the external portion of the problem. Historian Martin Van Creveld, in his book Supplying War, maintains that the Axis sustainment problem was unsolvable from the outset even without offensive operations--a constraint that was noted by the OKH before forces were deployed.<sup>20</sup> He asserts that sea interdiction had minimal effect on Rommel's supply status except during the period of November-December 1941 (Auchinleck's Operation Crusader). Instead, he posits that the problem was one of receipt and distribution within the theater of operations. Difficulties were a result of limited port capacities, inadequate staging areas, and excessively long and vulnerable lines of communication.<sup>21</sup>

Operationally, Malta provided Britain with an air and naval base of operations

to attack this vulnerability. The objective was to weaken Axis forces by interdicting supplies and preventing reinforcements while British forces gained strength and modern equipment. Axis air operations against Malta were required to permit passage of convoys to Tripoli. During Rommel's first offensive, Kesselring dedicated an entire Fliegerkorps to that mission. The harder Malta was hit, the more Axis supplies and reinforcements got through.

Axis air operations permitted more supplies to be brought in from Italy than Rommel could consume. Yet without a railroad or adequate road infrastructure, even a truck force ten times greater than one supporting a similar-sized German force in Russia would not allow him to bridge the gap of over 1000 miles from his base in Tripoli.<sup>22</sup> Nevertheless, the air and sea effort required to supply the theater cannot be ignored. The dedication of a Fliegerkorps and the employment of 100,000 tons of sea power to escort 20,000 tons of merchant resupply effort is noteworthy.<sup>23</sup> At the same time, air power was siphoned off that could have supported the land battle.

Rommel's early tactical successes were many. They rapidly destroyed most of the British armored brigade in Cyrenaica. But they did not break the fabric of the British forces or destroy its will. Infantry reinforcements with a small reserve of tanks were able to hold the strong defensive positions on the Egyptian frontier, and Tobruk was held for nearly seven months with resupply by sea. Rommel estimated that it would take four armored divisions to seize Tobruk, and without Tobruk he did not possess the forward supply base he thought necessary to make further advance into Egypt possible.

A strong case can be made questioning Rommel's assessment of the necessity and possibilities of securing Benghazi and Tobruk in his operational design. Because of shortages in intercoastal shipping, Benghazi provided a capacity for forward supply basing of only 15,000 tons per month. The fact that Tobruk could practically offer

only 600 tons per day for a combat force consuming 6000 tons per day during offensive operations casts doubt on Rommel's persistence in seeking to secure it for the purpose of supporting offensive operations that even then required a ground LDC of nearly 200 miles. The bulk of supplies still had to be transported over 1000 miles.<sup>24</sup> The impact of this distance, for example, was the use of ten percent of the fuel to move the other 90 percent resulting in the largest user, the Afrika Korps, losing 30-50 percent of its fuel in distribution alone!<sup>25</sup> Moreover, about 35 percent of the motor transport was non-operational because of the maintenance problems created by the 1000 mile trip each way.<sup>26</sup> Add to this the fact that during the month of November 1941, the RAF and Long Range Desert Group armored cars inflicted losses of almost 50% on the supply convoys attempting to sustain forward forces, and it becomes apparent that the problem was truly unsolvable under any conditions.

In this situation what were Rommel's possibilities? He did not have adequate forces to capture Tobruk and continue an advance into Egypt. Even were it permitted by Hitler, retreat would have been an admission of poor judgment and would have called Rommel's competency into question. To remain at the end of extended and vulnerable supply lines was a day to day battle for survival.

Rommel answered with the ill-fated "dash to the wire," but not until Operation Crusader was well underway. This daring offensive effort was consistent with Rommel's aggressive maneuver solutions to poorly comprehended sustainment problems.

Planning for Auchinleck's Operation Crusader began in August when the British Eighth Army was created. A key part of the campaign plan required time to marshal forces and conduct concentrated air and sea operations against Rommel's forces and supply bases before the attack could proceed.

When Axis air was diverted to Greece or to combat British air attacks on supply lines in the desert, Malta regained strength and Axis supply losses rose. In August 1941, the Axis lost 10-35% of its supplies to sea interdiction;<sup>27</sup> and in October,

just prior to Crusader, 35-65% of its supplies were interdicted at sea<sup>24</sup>. By November, Auchinleck believed that his forces possessed enough strength and that Rommel's forces had been sufficiently weakened to make an offensive possible and felt no more advantage would accrue by waiting.

Auchinleck and Cunningham identified the Afrika Korps as the center of gravity prior to the start of Crusader, and the operational plan was designed to bring it to battle in the vicinity of Sidi Rezegh. Sensing Rommel's increasing sustainment problems, Cunningham chose a piece of key terrain from which he could establish a strong defensive posture and destroy German armored forces as they fell back to protect their vulnerable lines of support. Had Cunningham massed the preponderance of his combat power and had Rommel been a cooperative enemy and not dashed for the Egyptian frontier, a decisive result might have been achieved.

Uncooperative Rommel aimed his combat power at the British logistics base and stockpiles in Egypt and chose not to maneuver to destroy British armored forces threatening his supply lines or fall back upon those supply lines to regain strength. Failing to uncover and destroy these depots, his bold maneuver did not permit him to strike at the brain of the opposing force. Instead he presented himself with more dangerously extended lines of communication and a diminishing capacity to sustain his forces.

However, his actions did have an effect on the will of the opposing commander and could have permitted him to be successful if Auchinleck had not taken personal command of the British Eighth Army. If Cunningham had withdrawn his armored forces to protect his own headquarters and support base, Rommel would have been in a strong defensive position to destroy British armored forces. However, Auchinleck recognized the vulnerability of Rommel's sustainment and understood that Axis power was waning while British strength increased due to its closer proximity to its supply base and better rail and wheeled transportation infrastructure.

Still, Rommel's brilliant withdrawal prevented Auchinleck from enveloping and destroying the Afrika Korps. The German force retained prepared defensive positions at El Agheila while British forces destroyed or captured remaining pockets of Axis forces at Bardia, Sollum, and Halfaya.

At this point, several factors were working on the offensive and defensive culminating points of each force. Rommel was only 450 miles from his base in Tripoli and was strengthened by two Italian divisions and the arrival of a convoy. British forces had expended a great amount of combat power and were now 800 miles from their support base, while demonstrating a poor battlefield recovery and regeneration capability. With Japan's entrance into the war, Commonwealth nations withdrew forces from the Western Desert to compound the diminishing combat power situation.

Once again Rommel sensed that the British had stuck their necks out without defeating the Axis counterstroke capability. Rommel knew that he could not expect more forces. He saw no further advantage to waiting; and he struck first, intending to catch the British off balance, capture supplies, and drive to Alexandria after securing both Benghazi and Tobruk. Auchinleck had also intended to continue the attack after a pause to stockpile supplies and refit exhausted armored forces but the additional time required by the extended distances coupled with the dispatch of Commonwealth forces permitted Rommel to be ready first.

From the time Operation Barbarossa was initiated, Rommel no longer accrued any advantage from waiting, since the probabilities of his posture strengthening and his opponent's weakening were remote. Reinforcement was doubtful and the ability to resupply, reequip, and reinforce existing forces was jeopardized when air power committed against Malta was diverted and pressure on British operations against Axis sea LOCs diminished. Britain accrued a benefit from waiting and defending on the Egyptian frontier. The defense allowed the British time to build up forces with modern equipment, to train green replacements, and to shift combat power from

Palestine where it was no longer required to counter an Axis ground threat to Iraq and the Persian Gulf oil.

Rommel continually drove Axis forces to seek an offensive solution. His dash to the Egyptian frontier was an example of the effect of personality and chance in this major operation. In spite of the limited possibilities imposed by an impossible sustainment situation, he imagined a way to expand the possibilities of his original operational design. Rommel chose to lead a strike aimed at the brain of the British forces and avoid a battle of attrition with an opponent growing bigger and stronger. His decision was bold but demonstrated his poor appreciation for the role of sustainment in this isolated theater. He neglected his own and placed too much stock in the importance of his enemy's.

The operational design of Operation Crusader called for a pause on the defensible terrain at El Agheila. During the initial phase of the operation, Britain's ability to reinforce kept it from reaching its culminating point and permitted a strong defense when forces reached El Agheila. Auchinleck believed that as long as a secure base of operations was maintained in Egypt the material strength of the Allies could replace losses. However, he did not count on the strategic diversion of forces along with attrition to weaken British forward defenses and cause the culmination that offered Rommel another offensive opportunity.

However, Rommel's higher attrition of nearly two times men and tanks and his inability to reinforce and reconstitute armored forces over extended LOCs required Axis forces to fall back on their sustainment base to save the Afrika Korps and the Italian infantry forces investing Tobruk. It can be argued that Rommel reached his offensive culminating point when he launched his unproductive dash to the wire of the Egyptian frontier. From that time on, he could not defend until he shortened his lines of supply.

There were two more crossings of the Western Desert in these seasaw campaigns.

Not until General Montgomery assembled and retained sufficient combat power superiority and demanded the time to prepare an operational design that fully supported the Allied strategic aims was victory achieved. His operational design demanded a methodical advance with sustainment preparations planned and rehearsed to insure that superior combat was maintained and the Axis forces defeated before the British force reached its culminating point. This time policy and the stability of strategic aims permitted him to retain the necessary combat power until the operational objective was achieved.

The concept of the culminating point provides a benchmark for campaign design and offers a planning and directing focus for the commander and his staff. Recommendations and decisions can be made with a focus on the possibilities that exist and the knowledge that physical and moral factors may limit or expand those possibilities and set the conditions for victory.

One can see from the discussion that it is important for the operational planner and commander to understand the significance of the concept of culmination. The nature of modern warfare will likely dictate an operational pause sometime during a campaign. The operational planner must recognize that culmination will occur if adequate resources are not programmed to sustain the campaign and the means provided to insure that the operation does not culminate before the operational objective is achieved. In this case, as in many others, there is a requirement to synchronize operational maneuver with supporting operations that enhance one's own sustainment of combat power and attack one's opponents' capability. Such action prevents culmination of one's own force while it contributes to the culmination of the enemy force.

### C. The Operational Artist

Most military theorists have attempted to identify the requisite qualities of a successful operational artist. The basis of these qualities is what Clausewitz describes as the essence of military genius: "the combination of intellect and temperament that are outstanding and reveal themselves in exceptional achievements".<sup>29</sup> The qualities described in the first chapter--competence, judgment, boldness, rashness, determination and obstinacy-- refine these combinations and provide a baseline to examine artists.

Competence is the ability to do one's job under ordinary as well as extraordinary circumstances and is based on good judgment. Jomini describes judgment by the French term coup d'oeil and includes an awareness of the situation that in an operational sense clears the ambiguity from the battlefield. Clausewitz asserted that:

"War is the realm of uncertainty; three quarters of the factors on which action is based are wrapped in a fog of greater or lesser uncertainty. A sensitive and discriminating judgment is called for; a skilled intelligence to scent out the truth."<sup>30</sup>

Discrimination is an act of choice, and sound judgment is the basis for choice. The bold commander chooses a course of action that will produce the greatest success but is also reasonably executable; while a rash commander makes his choice based solely on its perceived payoff. The rash commander thus subordinates sound judgment to the expected payoff.

Finally, Clausewitz describes the difference between determination and obstinacy as a fault of temperament. Determination is the imposition of will based on sound

judgment, where as obstinacy is a will to act in light of poor or faulty judgment.

In any discussion of history, theory, and operational art, the reader can see the that it is virtually impossible to separate the artist from the creation. They appear bonded by the mind and will of the creative phenomenon. However, it is possible to make some comments about the operational artists of the Western Desert and in the process gain some insights about the qualities that make them different and the difference the artists make on circumstances and events. In this way we can also examine the adequacy of the military theory.

As we have seen, Erwin Rommel was by far the dominant figure in the Western Desert. Because of this dominance, Axis success or failure was his alone. His participation in the earlier European campaign provided a deep base of experience for competent judgment and his personality was characterized by boldness and determination. However, it was his ability to draw on his experience and the personal will to take counsel of his personality during the chaos of war that separated him from others.

By the same token, his European experiences and strong personality allowed his operational vision to be clouded by the false possibilites created by tactical successes alone. Previous experience had shown him that tactical successes caused an enemy to crumble and present operational opportunities upon which a bold commander could capitalize. But previous experience failed to provide him the framework to deal with the vastly different circumstances of a secondary, isolated theater contested by an equally determined enemy.

Rommel's strong personality demanded his constant personal involvement and enabled brilliant tactical successes. He led from the front, developed innovative tactics such as the use of the 88-mm antitank screen, and used personal intervention to insure the execution of tactical plans. These same qualities were the ones that led him to believe that tactical success would automatically result in the

accomplishment of strategic aims without the proper consideration of operational factors such as air power, sea power, and sustainment. Previous discussion has addressed the resulting culmination without victory.

Through Rommel's performance in the Western Desert, it is possible to see that even the most experienced and dynamic commander can fall victim to chance, and friction despite efforts to overcome them. For example, the dash to the Egyptian frontier during the British Operation Crusader could have been considered the act of a bold, determined genius if British armored forces had been destroyed as they fell back on threatened supply depots and Auchinleck had not chosen to act. Instead, Rommel's act is considered one of rashness born of poor judgment. It borders on obstinacy toward a logistically impossible offensive solution to a defensive strategic aim.

On the other hand, he did recognize the operational significance of defeating British armored forces and seizing the Suez Canal, an objective that would allow the Axis to achieve greater strategic aims. But, in terms of Axis global strategy, these were the wrong aims and therefore not resourced.

In contrast, LTG Richard O'Connor has been described by Correlli Barnett in his book, The Desert Generals, as "the forgotten victor...little here of the facade of greatness, yet no one could talk a quarter of an hour with him without being aware of unusual qualities of character and personality."<sup>31</sup> Though inexperienced in both desert fighting and the command of large formations, he was a scholar. His brilliant campaign against the Italians in early 1941 was characterized by thorough planning and flawless execution of an initial set-piece battle followed by a pursuit that exhibited innovation in tactics and sustainment. He achieved the destruction of the Italian Tenth Army with a British force outnumbered in all measures of material combat power and with inexperienced soldiers.

O'Connor used military judgment and intuition to posture his outnumbered forces

to take risks based on tactical and administrative innovation that made an operational opportunity possible. He visualized that the opportunity created by a deep thrust could unbalance the Italian force and defeat the Italian commander's will.

When the opportunity presented itself following the set-piece battle at Sidi Barani, his personal intervention urged subordinate commanders to press the advance on nothing but a shoestring of sustainment and the knowledge that half of his force would depart by the night of 11 Dec 1940. The first British victory of the desert strengthened the force's confidence, and the promise of innovation was realized when forward stockpiling sustained the advance. O'Connor visualized the opportunity then capitalized on it by using imagination and taking risk under extraordinary circumstances.

Continued success in the pursuit gained O'Connor additional forces from Wavell and gave the Western Desert force confidence to continue. Unlike Rommel, O'Connor's "glance of the eye" prompted him to make sustainment his primary concern and it absorbed most of his time and effort. Once again, O'Connor placed his effort where he saw the most to be gained--supporting the pursuit. To continue the pursuit required continuous sustainment and to O'Connor, this was an operational imperative.

Even with supply difficulties and the constant threat of losing forces to other theaters of operation, O'Connor was determined to destroy the Italian force. His thrust to Beda Fomm cut off the Italians and accomplished this end. However, to remove the Italians from North Africa and secure the Mediterranean coast required the British to capture Tripolitania and the port of Tripoli that formed the Axis base of operations in the theater.

When British forces were diverted to Greece and Rommel had arrived in Libya with part of the first German reinforcing division, O'Connor was ordered to defend at El Agheila. Rommel later related that Tripolitania could not have been defended at that

time, and the British lost an opportunity.<sup>32</sup> As Barnett describes:

The temptation was there to advance without orders, present the fait accompli of a victory, and force the Cabinet into support. There have been other generals who, when convinced they are right, have not balked at covert disobedience. It was repugnant both to O'Connor's character and his sense of public duty.<sup>33</sup>

In this instance, the good judgment was present, but boldness contradicted a deeper character trait.

Intuition suggests that the operational artist possesses unique qualities that make him different from others. Military theory attempts to identify commanders' personality characteristics that have had a significant impact on the outcome of operations and campaigns and suggests that development of these traits will assist in the creation of the operational artist. History records that Rommel, O'Connor, and other commanders in the Western Desert possessed some of these qualities and the operations and campaigns provide examples of their practical application. But all three--intuition, theory, and history--offer no formulae or recipes.

Behavior in war is far too complex for a recipe or formula. Each commander's intellect and experience varies greatly and defies any attempt to draw generalized conclusions about specific qualities displayed in unique circumstances. However, they do provide a starting point and one must search to find a successful operational commander that did not possess most of the positive qualities discussed. Of all, the requisite quality of sound judgment appears to be absolute, sound judgment in the context of the proper balance of keen intellect and steady temperament. Nevertheless, an appreciation of all the qualities and their relationship to the successes and failures of the operational artist will deepen one's appreciation for the artist and assist in one's understanding of the operational art.

#### IV. Conclusions

The campaigns in the Western Desert provide a unique time and place in which to examine the operational art. No other theater of operations offers the same circumstances under which the operational artists practiced their craft. Military theory suggests a framework to observe the phenomena of operational art, and the history of the Western Desert campaigns is replete with practical applications.

Three operational issues--the linkage between strategic aims and operations, the concept of culminating points, and the personality of the operational artist--were chosen from among many for detailed discussion because of their significant impact on designing campaigns and shaping their outcome. The disconnects between strategic aims and operations compromised operational design. Coupled with the ability or inability to recognize and act at culminating points, the disconnects compromised operational planning, resource allocation, and the synchronization of supporting operations. Both jeopardized the success of a campaign or operation. Finally, the character and personality of the operational artist were manifested in decisions and actions that impacted on nearly every facet of the campaigns and operations; and where they didn't impact, chance took over. For each issue, theory is partially borne out in history.

Clausewitz suggests that war cannot be regarded as the preceptor of policy and asserts that statesmen must understand war so that they do not use it incorrectly.<sup>34</sup> If they do use it incorrectly, then it is the policy which is wrong, not the fact that policy is influencing the war.<sup>35</sup> He further asserts that the military objective of policy should be the defeat of the enemy force.<sup>37</sup> The policies of Churchill and Hitler and the resources allocated to support the policies as well as Rommel's

attempt to influence policy without regard to resources bear this out. Future planners must design campaigns that recognize the necessity for establishing the correct linkages and the appropriate resource allocations to cement the relationship.

Theory also suggests that culmination is a function of maintaining a superiority of combat power and will until the military objective is achieved. It further suggests that a single decisive battle is unlikely and several battles over extended periods of time may be necessary ultimately to achieve the objective. Future planners must recognize the possibilities and consequences of culmination as a result of the application of forces over time and take measures to capitalize on the opportunities that are within those possibilities or take some action to expand those possibilities and consequently create more opportunities. The dynamic of increasing and diminishing strengths of opposing forces is a key factor in the time and space relationships of campaign planning.

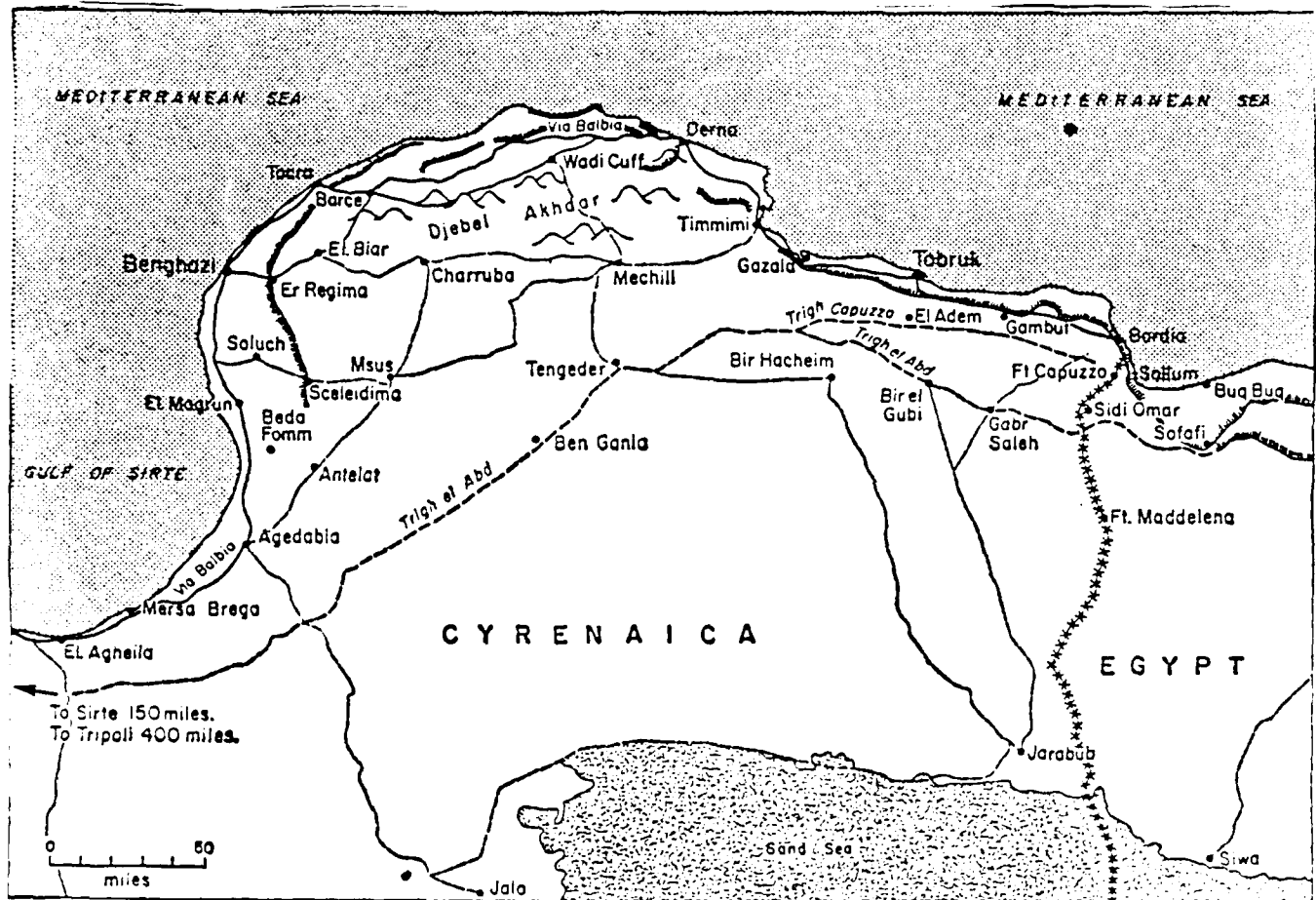
When addressing the operational artist, theorists suggest that there are certain requisite qualities for a successful operational artist. Our examination of history bears this out in some measure and reinforces the concept that no formulae exist to offer an ironclad guarantee of success. In actuality, no operational artist possessed all of the qualities nor did any one display every quality in great strength on every occasion.

Nevertheless, any measure taken to develop sound judgment forms the basis for all the other qualities short of genius. Since geniuses are rare, the aspiring operational artist should take every opportunity to improve his judgment. A study of theory and history along with the frequent practical application of them appears to present a well-traveled road to success. Clausewitz sums up the significance of theory and practice:

The insights gained and garnered by the mind in its wanderings among basic concepts are benefits that theory can provide. Theory cannot equip the mind with formulas for solving problems, nor can it mark the narrow path on which the sole solution is supposed to lie by planting a hedge of principles on either side. But it can give the mind insight into the great mass of phenomena and of their relationships, then leave it free to rise into the higher realms of action. There the mind can use its innate talents to capacity, combining them all so as to seize on what is right and true as though this were a single idea formed by their concentrated pressure--as though it were a response to the immediate challenge rather than a product of thought.<sup>37</sup>

V. Maps

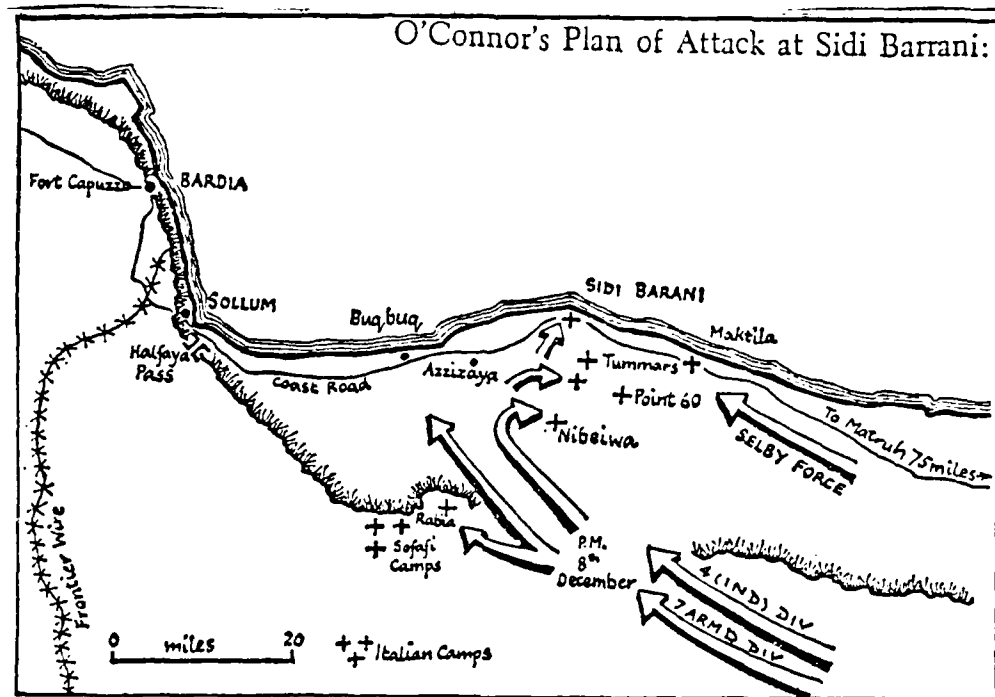
Map 1. The Western Desert



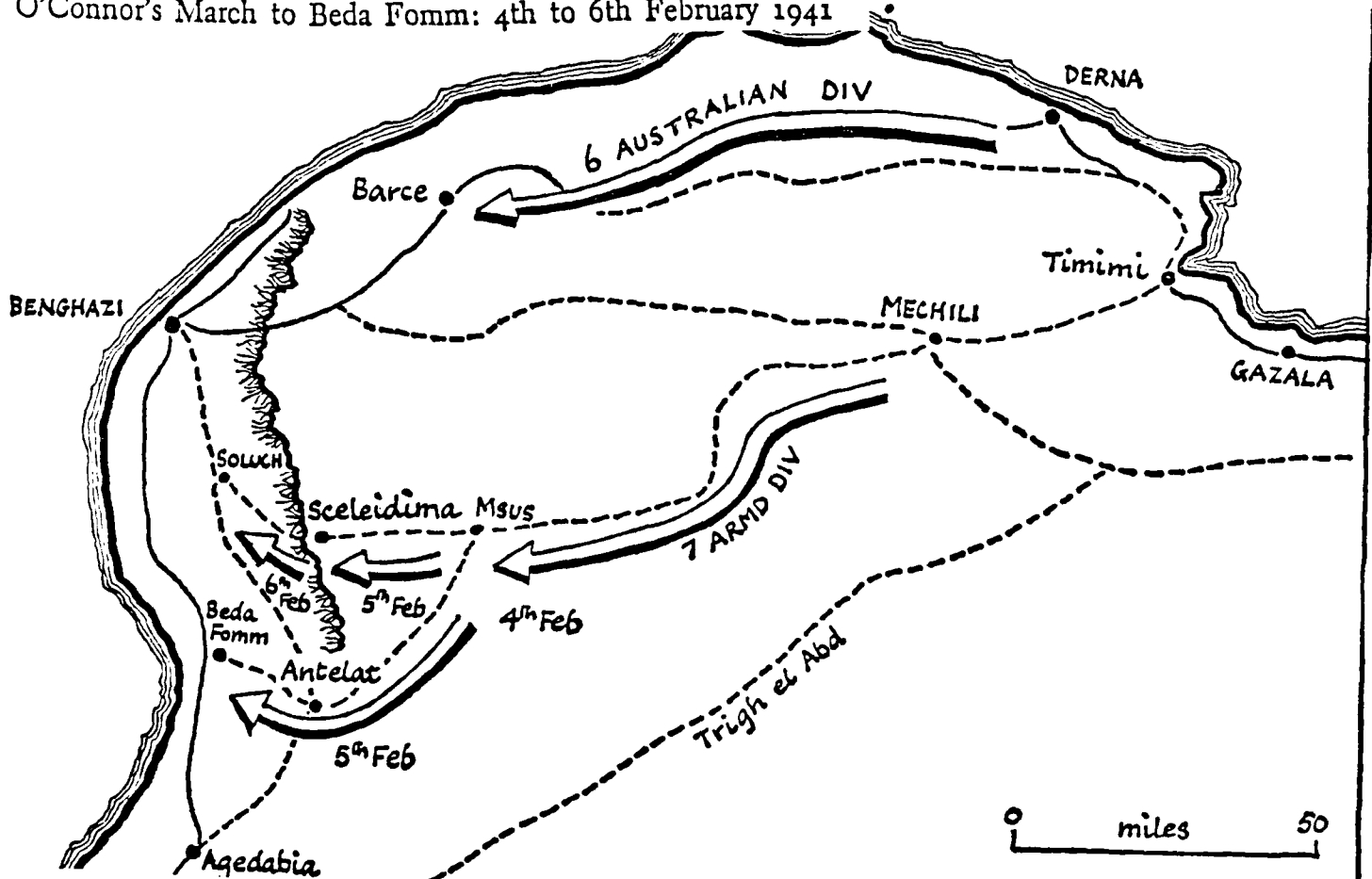
MAJOR OPERATIONS

		3-40 GRAZIANI 9-40
2-41	WAVELL-O'CONNOR OFFENSIVE	12-40
3-42	ROMMEL'S FIRST OFFENSIVE	5-41
12-41	AUCHINLECK'S OFFENSIVE	11-41
1-42	ROMMEL'S SECOND OFFENSIVE 2-42	
		5-42 ROMMEL 8-42
1-43	MONTGOMERY'S FINAL OFFENSIVE	10-42

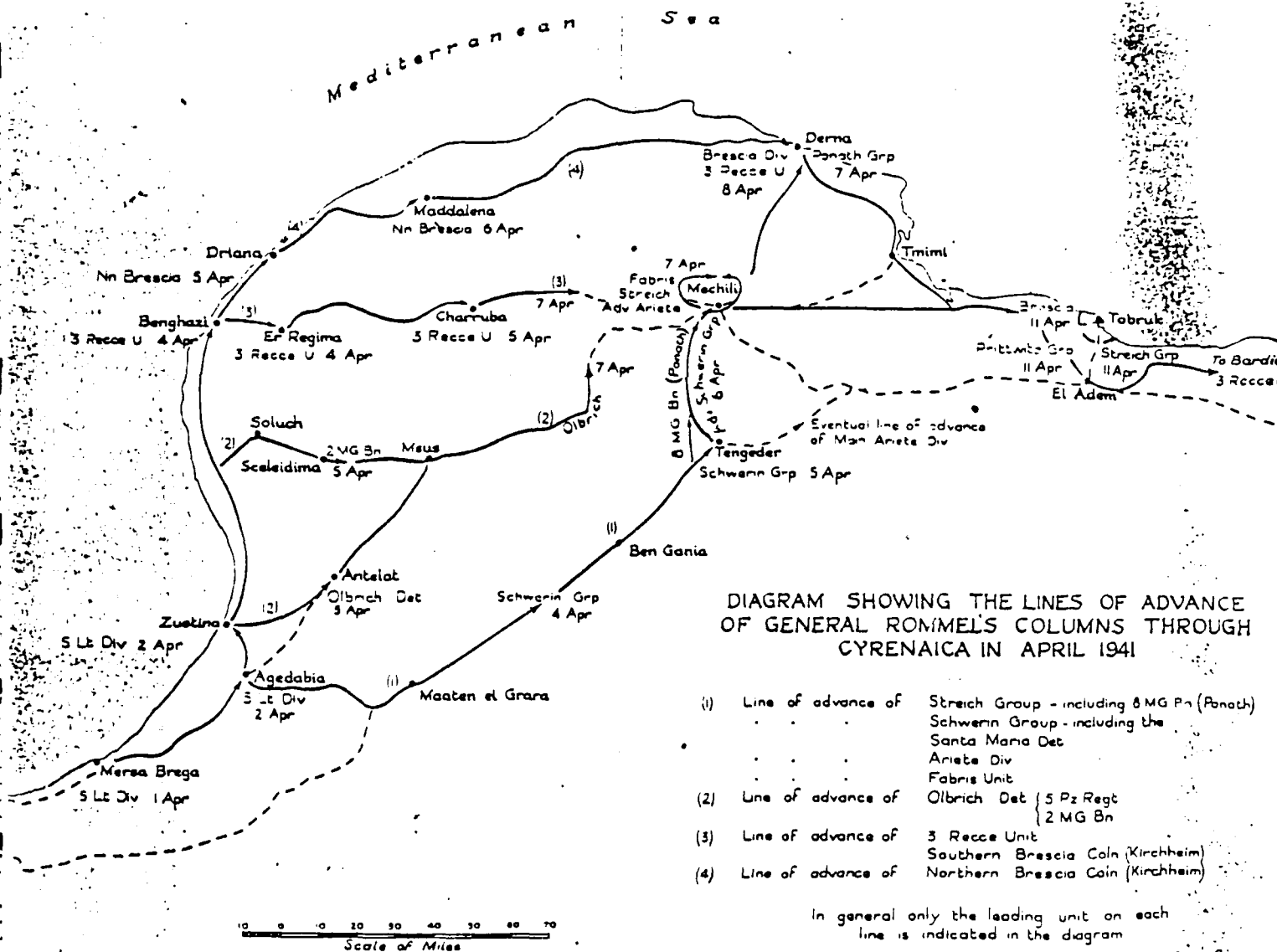
Map 2. First British Offensive



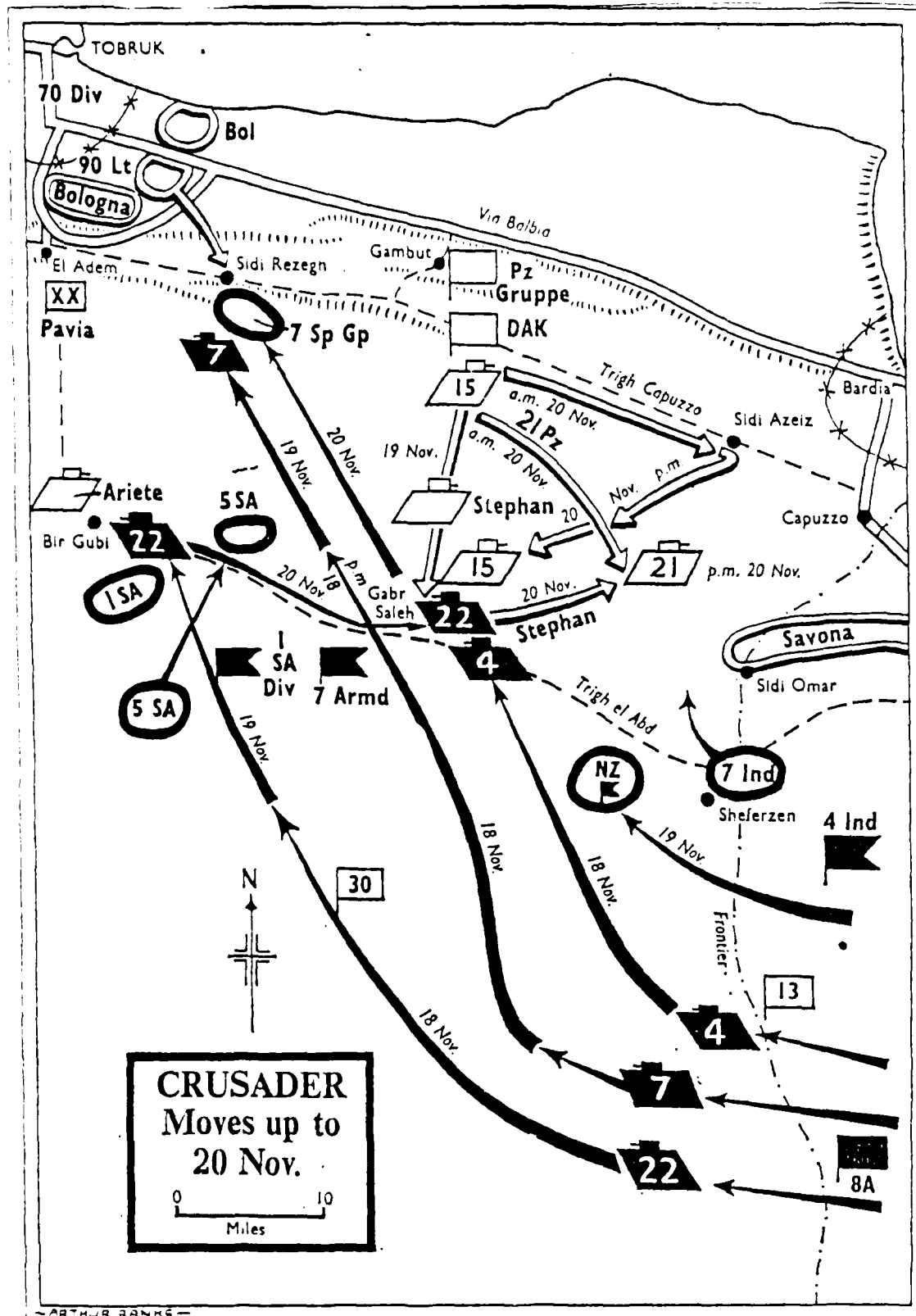
O'Connor's March to Beda Fomm: 4th to 6th February 1941



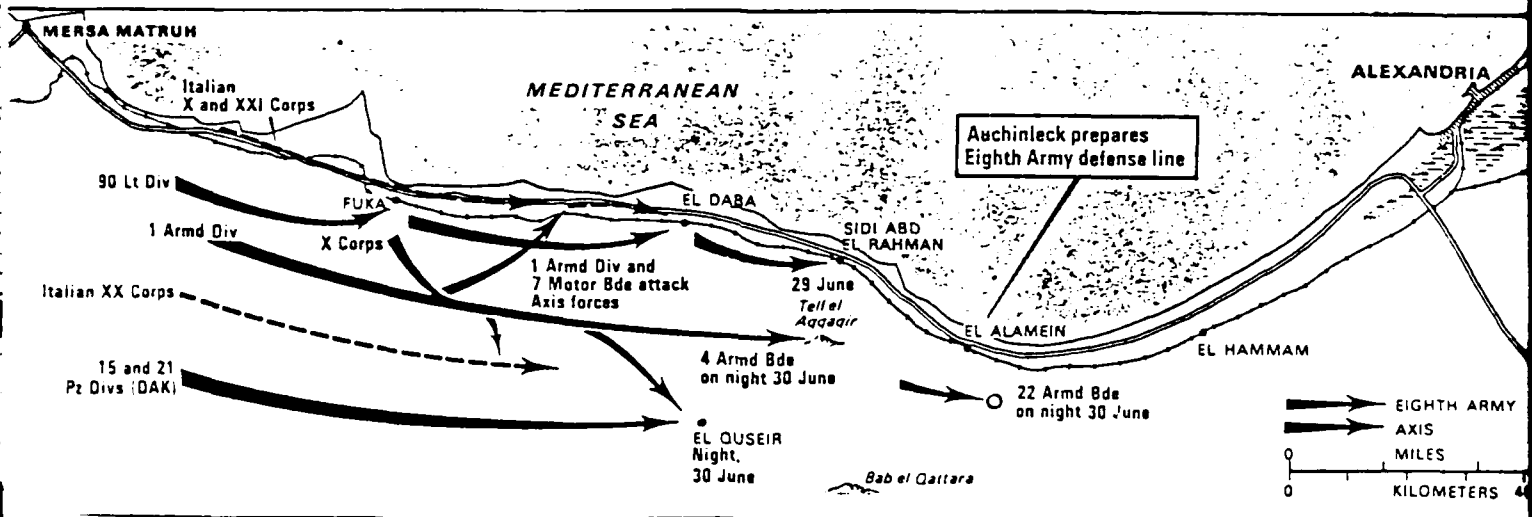
Map 3. Rommel's First Offensive\*



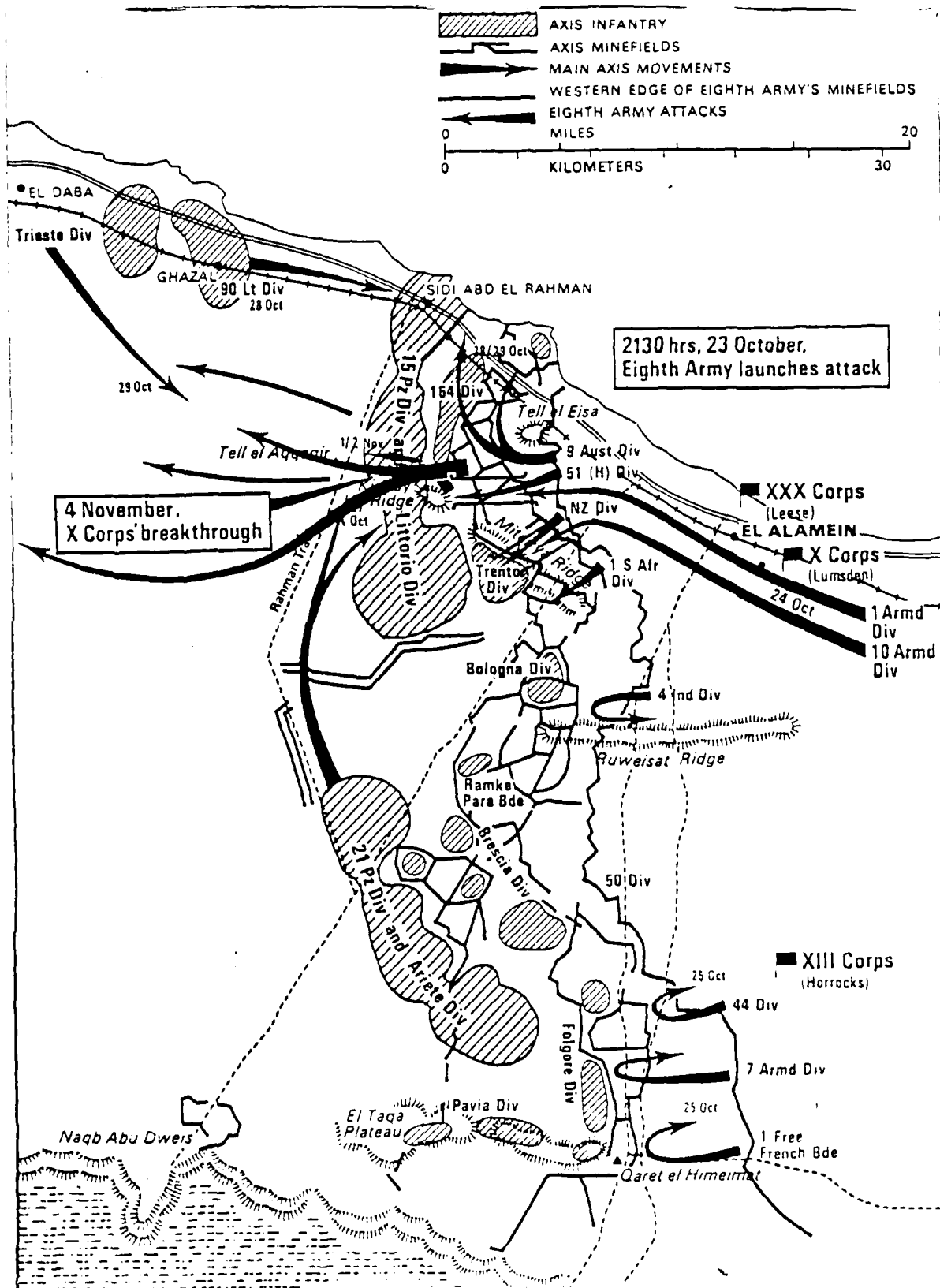
Map 4. Auchinleck's Offensive 41



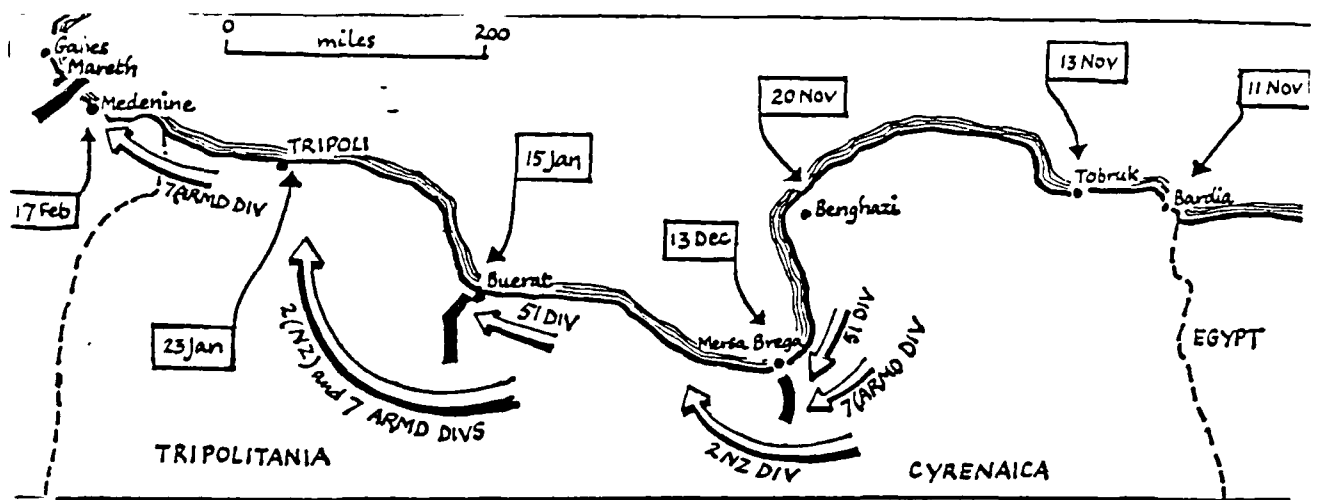
Map 5. Rommel's Second Offensive<sup>42</sup>



Map 6. Montgomery at El Alamein



Map 7. Pursuit to Tunisia<sup>44</sup>



Eighth Army's Advance from El Alamein, 12th November 1942 to 23rd January 1943

## VI. End Notes

<sup>1</sup> Sir William G. Jackson, The Battle for North Africa 1940-43 (New York: Mason/Charters Publishers, Inc., 1975) p. 50.

<sup>2</sup> John Strawson, The Battle for North Africa (New York: Scribner and Sons, 1969) p. 7.

<sup>3</sup> Department of Military Art and Engineering, United States Military Academy, The War in North Africa-Part 1 (West Point: United States Military Academy, 1951) p. 2. Hereafter cited as USMA MAE.

<sup>4</sup> Ibid., p. 2.

<sup>5</sup> Ibid., p. 2.

<sup>6</sup> Ibid., p. 2.

<sup>7</sup> Ibid., p. 4.

<sup>8</sup> Ibid., p. 6.

<sup>9</sup> Corelli Barnett, The Desert Generals (Indiana: Indiana University Press, 1960) p. 64.

<sup>10</sup> Jackson, op.cit., p. xiii.

<sup>11</sup> Strawson, op.cit., p. 47-8.

<sup>12</sup> Ibid., p. 48.

<sup>13</sup> Ibid., p. 68.

<sup>14</sup> USMA MAE, op.cit., p. 17.

<sup>15</sup> Carl von Clausewitz, On War, edited and translated by M. Howard and P. Paret (Princeton: Princeton University Press, 1976) p. 528.

<sup>16</sup> Ibid., p. 528.

<sup>17</sup> Ibid., p. 572.

<sup>18</sup> Ibid., p. 572.

<sup>19</sup> Ibid., p. 572.

<sup>20</sup> Ibid., p. 181-182.

<sup>21</sup> Ibid., p. 201.

<sup>22</sup> Martin van Creveld, Supplying War (Cambridge: Cambridge University Press, 1977) p. 185.

- <sup>23</sup> Ibid., p. 191.
- <sup>24</sup> Ibid., p. 187.
- <sup>25</sup> Ibid., p. 190.
- <sup>26</sup> Ibid., p. 190.
- <sup>27</sup> Strawson, op.cit., p. 72.
- <sup>28</sup> Ibid., p. 72.
- <sup>29</sup> Clausewitz, op.cit., p.100.
- <sup>30</sup> Ibid., p.101.
- <sup>31</sup> Barnett, op.cit., p. 22.
- <sup>32</sup> Ibid., p. 22.
- <sup>33</sup> Ibid., p. 64.
- <sup>34</sup> Clausewitz, op.cit., p.608.
- <sup>35</sup> Ibid., p. 608.
- <sup>36</sup> Ibid., p. 597.
- <sup>37</sup> Ibid., p. 578.
- <sup>38</sup> Jackson, op.cit., p. 116.
- <sup>39</sup> Ibid., pp. 51 and 85.
- <sup>40</sup> MGN I.S.O. Playfair et al., History of the Second World War: The Mediterranean and Middle East, Volume 2, (London, 1956), p. 24.
- <sup>41</sup> Strawson, op.cit., p. 78.
- <sup>42</sup> Richard Natkeil, Atlas of World War II, (New York, 1985), p. 54.
- <sup>43</sup> Ibid., p. 59.
- <sup>44</sup> Jackson, op.cit., p. 411.

## VII. Bibliography

### Books

- Agar-Hamilton, J.A.I. The Sidi-Rezegh Battles, New York: Oxford University Press
- Barnett, Corell: The Desert Generals, Bloomington: The Indiana University Press, 1969.
- Bekker, C. (Pseud) The Luftwaffe War Diaries, New York: Ballantine Books, Inc., 1969.
- Carell, Paul The Foxes of the Desert, translated by Mervyn Stone, New York: Dutton, 1961.
- Carver, LTG Sir Michael ed. The War Lords, London: Weidenfeld and Nicolson, 1976.
- Clausewitz, Carl von On War, ed. and translated by Michael Howard and Peter Paret. Princeton: Princeton University Press, 1976.
- Connell, John (Pseud.) Auchinleck, London: Cassell, 1959.
- Connell, John Wavell: Scholar and Soldier, London: Collins, 1964.
- Cruickshank, Charles Deception in World War II, Oxford: Oxford University Press, 1979.
- Department of Military Art and Engineering, United States Military Academy The War in North Africa Part I West Point: United States Military Academy, 1951.
- Detwiler, Donald S. ed. World War II German Military Studies Volumes 14 and 20, New York: Garland Publishing, Inc., 1979.
- Downing, David The Devils Virtuosos: German Generals at War 1940-5, New York: St. Martin's Press, 1977.
- Esposito, BG Vincent J. ed. The West Point Atlas of American Wars-Volume II 1900-1953, New York: Frederick A. Praeger Publishers, 1959.
- Farrar-Hockley, A. The War in the Desert, London: Faber, 1969.
- Hamilton, Nigel Monty: The Making of a General 1887-1942, New York: McGraw Hill Company, 1981.
- Hinsley, F.H. "North Africa and the Mediterranean, Nov 1950-June 1941," British Intelligence in the Second World War, New York: Cambridge University Press, 1979.
- Irving, David The Trail of the Fox, New York: Avon Books, 1977.

- Jackson, Sir William G. The Battle for North Africa 1940-43, New York: Mason/Charter, 1975.
- Jackson, Sir William G. "El Alamein," Decisive Battles of the Twentieth Century, edited by Christopher Dowling and Noble Frankland, New York: David McKay Company, Inc., 1976.
- Jomini, Baron von The Art of War, edited by Colonel Thomas Griess and Professor Jay Luvaas, Westport: Greenwood Press, Publishers, 1862.
- Lewin, Ronald Rommel as a Military Commander, London: Batsford, 1968.
- Lewin, Ronald The Chief: Field Marshall Lord Wavell, London: Farrar, Straus, Giroux, 1980.
- Lewin, Ronald ULTRA goes to War, New York: McGraw Hill Book Company, 1978.
- Liddell-Hart, B.H. ed. The Rommel Papers, New York: Harcourt, Brace Company, 1953.
- Macksey, Kenneth Guderian: Creator of the Blitzkrieg, New York: Stein and Day Publishers, 1975.
- Macksey, Kenneth The Afrika Korps, New York: Ballantine Books, 1968.
- Messenger, Charles The Blitzkrieg Story, New York: Charles Scribner's Sons, 1976.
- Natkeil, Richard Atlas of World War II, edited by Peter Young, New York: The Military Press, 1985.
- Pitt, Barrie The Crucible of War: Western Desert 1941, London: Jonathan Cape, Ltd, 1980.
- Playfair, MGN I.S.O. et. al. History of the Second World War: The Mediterranean and Middle East, Volumes 2 and 3, London: Her Majesty's Stationery Office, 1956.
- Schmidt, H.W. With Rommel in the Desert, London: Harrap, 1951.
- Schores, Christopher and Ring, Hans Fighters over the Desert: The Air Battles in the Western Desert June 1940-December 1942, New York: Arco Publishing Company, 1969.
- Strawson, John The Battle for North Africa, New York: Charles Scribner's Sons, 1969.
- Van Creveld, Martin Supplying War: Logistics from Wallenstein to Patton, Cambridge: Cambridge University Press, 1977.
- Von Mellenthin, F.W. Panzer Battles, translated by H.Betzler and edited by L.C.F. Turner, New York: Ballantine Books, 1956.
- Young, Desmond Rommel, The Desert Fox, London: Collins, 1950.

Government Documents

The Eighth Army: September 1941 to January 1943, prepared for the War Office by the Ministry of Information, London: His Majesty's Stationery Office, 1944.

END

DATE

FILMED

JAN

1988